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(54) Charging roll

(57) A charging roll which is held in contact with an outer circumferential surface of an image bearing medium for charging the surface of the image bearing medium by application of a DC voltage and an AC voltage which is superimposed on the DC voltage, the charging roll comprising: a center shaft (12, 22); an electrically conductive base layer (14, 24) formed on an outer circumferential surface of the shaft; an outer structure (16, 18; 26, 28, 30) formed on an outer circumferential surface of the conductive base layer; and the charging roll having Asker C hardness of less than 48 degrees as measured upon application of 1kg load thereto and micro rubber hardness in a range of 65-85 degrees as measured upon application of 33.85g load thereto.

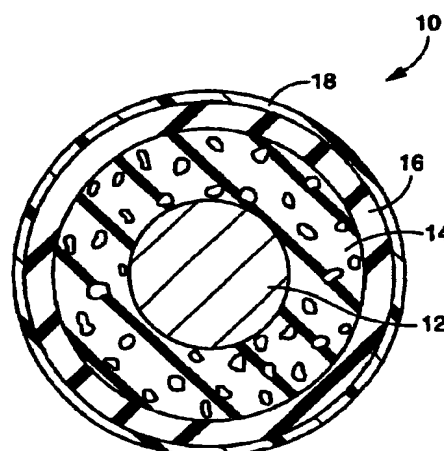


FIG. 1

EP 0 797 128 A3



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# EUROPEAN SEARCH REPORT

Application Number  
EP 97 10 4598

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.8)
A	EP 0 636 949 A (CANON KK) 1 February 1995 (1995-02-01)  * column 5, line 2 - column 9, line 26; figures 1,5-7 *	1-7, 9-15, 17-20	603G15/02
A	PATENT ABSTRACTS OF JAPAN vol. 013, no. 480 (P-952), 31 October 1989 (1989-10-31) -& JP 01 191161 A (CANON INC), 1 August 1989 (1989-08-01) * abstract *	1,3,12, 15,20	
A	EP 0 631 205 A (TOKAI RUBBER IND LTD) 28 December 1994 (1994-12-28)  * page 3, line 54 - page 4, line 56; figure 1 *	1-7,9, 11, 13-15, 17,19	
			TECHNICAL FIELDS SEARCHED (Int.Cl.8)
			603G
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>23 May 2000</b>	Examiner <b>Cigoj, P</b>
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 97 10 4598

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23-05-2000

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0636949	A	01-02-1995	JP 7043983 A	14-02-1995
			JP 7043984 A	14-02-1995
			JP 7044085 A	14-02-1995
			JP 7092776 A	07-04-1995
			DE 69414047 D	26-11-1998
			DE 69414047 T	22-04-1999
			EP 0840176 A	06-05-1998
			EP 0843231 A	20-05-1998
			US 5765077 A	09-06-1998
JP 01191161	A	01-08-1989	JP 2067896 C	10-07-1996
			JP 7097246 B	18-10-1995
EP 0631205	A	28-12-1994	JP 7077859 A	20-03-1995
			DE 69410534 D	02-07-1998
			DE 69410534 T	26-11-1998
			US 5604031 A	18-02-1997

EPO FORM P0559

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82